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ARS-71-3
Supplement 5
6-17-57

UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH SERVICE

LIST OF PUBLICATIONS AND PATENTS

of the
Northern Utilization Research and Development Division
Peoria, Ill.

July - December 1956

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PUBLICATIONS

[Publications marked (*) are not available for distribution]

PROPERTIES OF PERIODATE OXIDIZED STARCH.

J. W. Sloan, B. T. Hofreiter, R. L. Mellies, and I. A. Wolff.
Indus. and Engin. Chem. 48(7): 1165-1172. July 1956.

A series of periodate oxidized corn starches covering the entire range from only 0.5 percent to essentially complete conversion of anhydroglucose to dicarbonyl units was prepared under mild reaction conditions thought to minimize degradation and side reactions. Starches of other varieties were also oxidized for comparison. Microscopic observation of the granules indicated progressive attack of the reagent at the hilum with increased oxidation, but without significant change in granular size in the samples as isolated. The optical rotation and extent of reaction with anthrone reagent varied in a regular fashion with the degree of oxidation. Slightly oxidized samples were soluble in starch solvents, such as formic acid and 33 percent calcium chloride solution, while more completely converted materials were not. All samples were soluble at autoclave temperatures in 50 percent aqueous chloral hydrate. Rather extensive degradation of oxystarch appears to occur in aqueous solutions at elevated temperature. A number of other physical and chemical properties of periodate oxystarches having different degrees of oxidation are discussed, including their behavior when molded under varying conditions of heat, pressure, and moisture content.

REMOVAL OF SILICATES FROM SOLUTIONS OF SUGARS SUCH AS ISOMALTOSE AND ISOMALTOTRIOSE.

R. W. Jones, R. J. Dimler, and C. S. Wise.
Analyt. Chem. 28(8): 1352-1353. August 1956.

Isomaltose and isomaltotriose separated on a carbon-Celite column are contaminated with silicates and other inorganic matter. These impurities interfere with characterization of the saccharides. The silicate cannot be removed by conventional ion exchange procedures without degradation of the reducing sugars. A method has been developed for converting the weakly ionized silicic acid to flurosilicic acid which can be removed by anion exchange resin. The removal of silicates can be carried out in the presence of reducing sugar without degradation or loss of carbohydrate. A method is also given for colorimetric determination of micro quantities of silica in sugar solutions.

QUANTITATIVE PAPER CHROMATOGRAPHY OF METHYLATED ALDOSE SUGARS. IMPROVED COLORIMETRIC METHOD USING ANILINE HYDROGEN PHTHALATE.

W. C. Schaefer and J. W. Van Cleve.
Analyt. Chem. 28(8): 1290-1293. August 1956.

In connection with studies of the structure of polysaccharides of the dextran class by methylation analysis, a reliable method was required for the quantitative paper chromatography of methol ethers of D-glucose. The procedure developed incorporates an improved colorimetric determination of the chromatographically separated and eluted sugars, using aniline hydrogen phthalate as chromogenic agent, under conditions giving increased reproducibility and sensitivity. In analyses of three representative synthetic mixtures of methyl ethers of D-glucose, recoveries of the individual components, were, on the average, within 4 percent of the amounts spotted. In 14 single determinations on samples of 2,3,4,6-tetra-O-methyl-D-glucose using the colorimetric procedure, a standard deviation of 3.84 percent was obtained. The optimum range of sample size was 90 to 200 γ of sugar. Since similar color development was observed with methyl esters of D-mannose, D-galactose, and D-xylose, this procedure is expected to have general value in the determination of methyl ethers of aldose sugars.

UREASE ACTIVITY IN SOYBEAN MEAL PRODUCTS.

Allan K. Smith, Paul A. Belter, and Robert L. Anderson.
Jour. Amer. Oil Chem. Soc. 33(8): 360-363. August 1956.

A method which uses direct titration of ammonia as a measure of urease activity was modified for use in the assay of raw and of slightly denatured soybean meal. The modifications adopted were the use of glutathione, a presoaking of the sample for 30 minutes at 40° C., and making the assay at 40° C. Data on the urease activity of several varieties of soybeans, and on immature and frost-damaged soybeans were determined.

WHEAT UTILIZATION RESEARCH PROGRAM OF THE U. S. DEPARTMENT OF AGRICULTURE AND ITS RELATION TO THE OPERATIVE MILLER.

F. R. Senti and W. D. Maclay.
Bul.--Assoc. of Operative Millers: 2264-2270. August 1956.

Selected examples were discussed of wheat utilization research being conducted in the Department of Agriculture at both the Northern and Western Utilization Research and Development Divisions. Studies on the structure of the wheat kernel, investigations of the relationship of kernel structure and composition to milling quality, the direct determination of bran in flour, and moisture relative-humidity relationships in wheat grain and flour were discussed in some detail because of their direct relationship to problems in milling. Other aspects of the research program on wheat, described more briefly, included investigations on the preservation of freshness in bread, involving both basic studies on bread staling and more applied studies on the freezing of bread and bakery products. Basic studies on the composition and properties of the proteins, lipids, and enzymes of flour and their relationship to baking qualities also were reviewed.

*THE CONTROL AND RECORDING OF pH IN SMALL SCALE FERMENTATIONS.

Robert G. Dworschack.
Proceedings of the Instrument Society of America, 11, pp. 56-17-1 through 56-17-1-8. September 1956.

The application of continuous pH control and recording to the fermentation industry has been retarded by the lack of suitable techniques for maintaining pure cultures. This paper describes equipment, its operation, and problems encountered in the controlling and recording of pH in 20-liter stainless steel fermentors. The sterilization of electrodes is the most important factor with pure culture fermentations and is discussed in detail. Application of these techniques to several different fermentations is discussed.

PSEUDOMONAS AUREOFACIENS KLUYVER AND PHENAZINE α-CARBOXYLIC ACID, ITS CHARACTERISTIC PIGMENT.

William C. Haynes, Frank H. Stodola, Joan M. Locke, Thomas G. Pridham, Howard F. Conway, Virgil E. Sohns, and Richard W. Jackson.
Jour. of Bact. 72(3): 412-417. September 1956.

A complete description is given of *Pseudomonas aureofaciens* Kluyver based on four strains. The characteristic pigment produced has been identified as phenazine α-carboxylic acid. This acid is produced in flasks and in pilot-plant fermentors to the extent of about one gram per liter of culture liquor. The pigment is able to inhibit the growth of some plant pathogens in artificial culture.

REACTIONS OF UNSATURATED FATTY ALCOHOLS. I. PREPARATION AND PROPERTIES OF SOME VINYL ETHERS.

H. M. Teeter, E. J. Dufek, C. B. Coleman, C. A. Glass, E. H. Melvin, and J. C. Cowan.
Jour. Amer. Oil Chem. Soc. 33(9): 399-404. September 1956.

Vinyl ethers of stearyl, oleyl, and polyunsaturated fatty alcohols have been synthesized in yields up to 80 percent from fatty alcohol and acetylene at atmospheric pressure. These ethers are readily polymerized in the presence of Lewis acid-type catalysts to solids or to viscous oils having molecular weights ranging from 600 to 5,000.

PROGRESS IN SOYBEAN RESEARCH.

L. L. McKinney.
Soybean Digest 16(11): 66, 68, 70-72. September 1956.

The development of methods for measuring urease in toasted and raw soybean oil meals, the use of the hemagglutinating test to determine nutritive value of soybean oil meals, the development of a flash desolventizer, and the development of vinyl ether derivatives of soybean fatty alcohols are described.

THE STRUCTURE OF NRRL B-512 DEXTRAN. METHYLATION STUDIES.

J. W. Van Cleve, W. C. Schaefer, and C. E. Rist.
Jour. Amer. Chem. Soc. 78: 4435-4438. September 1956.

Analytical periodate oxidation of the dextran produced from sucrose by *Leuconostoc mesenteroides* NRRL B-512 had indicated the presence of about 95 percent 1,6'-glucosidic linkages but could not establish the nature of the non-1,6'-linkages, although they were assumed by various workers to be 1,4'-linkages. Methylation studies now have proven that, in addition to the 1,6'-linkages, only 1,3'-linkages are present, occurring as branch points.

Trimethyl NRRL B-512 dextran having a methoxyl content of 45.4 percent was prepared by exhaustive methylation of the native dextran in liquid ammonia with sodium and methyl iodide. Hydrolysis in 1 $\underline{N}$ HCl-glacial acetic acid (1:1) at 95° C. gave a mixture of methylglucoses which was resolved by quantitative separation on a column of cellulose using methyl ethyl ketone-water azeotrope as the partitioning solvent. A ratio of tetramethylglucose:trimethylglucose:dimethylglucose of 1:21:1 was obtained. The dimethylglucose fraction was identified as 2,4-dimethylglucose and the trimethylglucose fraction as 2,3,4-trimethylglucose by conversion to their respective p-bromoanilides. The crystalline tetramethylglucose fraction was identified as 2,3,4,6-tetramethylglucose.

*PHOTOMICROGRAPHIC MOSAIC MAPS OF CEREAL GRAINS.
Roland W. Haines
Indus. Photography 5(10): 22-25 and 59. October 1956.

Techniques and procedures for making photomicrographs of complete sections of cereal grains, by the use of mosaics of photomicrographs and photomacrographs.

ANTIBIOTICS AGAINST PLANT DISEASE. I. LABORATORY AND GREENHOUSE ~~SURVEY~~.
Thomas G. Pridham, Lloyd A. Lindenfelser, Odette L. Shotwell, Frank H. Stodola, Robert G. Benedict, Colette Foley, and Richard W. Jackson, NU; William J. Zaumeyer, William H. Preston, Jr., and John W. Mitchell, Horticultural Crops Research Branch, ARS, USDA, Beltsville, Md.
Phytopathology 46(10): 568-575. October 1956.

Results from an extensive survey of 500 strains of *Streptomyces*, for antibiotics effective against plant disease are presented, with an account of the methods used. Based on their activities against a minimum of 12 phytopathogenic bacteria and fungi, 52 strains show promise. Culture filtrates from eight strains and two substances isolated from the mycelia of different strains have been tested thus far in the greenhouse against two to ten plant diseases. Nine of the ten materials show broad antifungal spectra in laboratory tests and activity against at least one disease in greenhouse tests. Phytotoxic effects were observed with some of the test materials.

ANTIBIOTICS AGAINST PLANT DISEASE. II. EFFECTIVE AGENTS PRODUCED BY *STREPTOMYCES CINNAMOMEUS* FORMA *AZACOLUTA* F. NOV.
Thomas G. Pridham, Odette L. Shotwell, Frank H. Stodola, Lloyd A. Lindenfelser, Robert G. Benedict, and Richard W. Jackson.
Phytopathology 46(10): 575-581. October 1956.

Streptomyces cinnamomeus f. azacoluta, NRRL B-1699, has been discovered to produce an interesting mixture of antibiotics in a medium of tap water, soybean meal, and glucose. Tests conducted in the greenhouse show that culture filtrates are effective against rust, anthracnose, downy mildew, and powdery mildew of beans; stem rust of wheat; and powdery mildew of bluegrass. Chemical studies have so far revealed three antibiotics in the mixture. Laboratory assays and greenhouse tests against bean rust using numerous chemical fractions indicate that none of the antibiotics are alone responsible for the activity against bean rust. Potency is retained in dried filtrates of the mixture.

*NOTE ON MOLECULAR WEIGHT AND ULTRACENTRIFUGAL SEDIMENTATION PATTERNS OF *STREPTOCOCCUS* SC DEXTRAN.
Frederic R. Senti and Nison N. Hellman.
Jour. Biol. Chem. 222(2): 747-749. October 1956.

Molecular weights of the whole soluble native dextran of *Streptococcus* SC, as well as of several fractions prepared from it, were determined by a light-scattering procedure, using a slightly modified Brice-Phoenix light-scattering photometer. The average molecular weight of the whole soluble dextran was 58,200, which is in the range designated by military purchase specifications as acceptable for clinical dextran. The unfractionated native streptococcal dextran possesses too wide a molecular weight distribution for clinical dextran. On the other hand, the middle fraction of the streptococcal dextran had nearly the desired molecular weight distribution.

The changes in molecular distribution resulting from fractionation of the whole soluble dextran, and the approximate suitability of the distribution of the middle fraction for clinical dextran, were further confirmed by ultracentrifugal examination.

STRUCTURE OF THE MATURE WHEAT KERNEL. I. GROSS ANATOMY AND RELATIONSHIPS OF PARTS.

Dorothy Bradbury, Irene M. Cull, and M. M. MacMasters.
Cer. Chem. 33(6): 329-342. November 1956.

A kernel of wheat is a dry, one-seeded fruit. It has on one surface a crease that, in the commonly grown varieties, extends inward nearly to the center. The pericarp (fruit coat) envelops the seed and is fused with the thin seed coat. Together they form two protective layers around the endosperm and the germ. The projecting lower tip of the germ is especially vulnerable to mechanical injury during harvesting and handling, and is often broken thus exposing germ tissue. When tissues beneath the seed coat are exposed, they are more readily entered by moisture, molds, etc., than when seed coat and fruit coat protect them.

The pericarp and the outermost tissues of the seed, through the aleurone layer, compose the bran. There is no natural line of cleavage between bran and starchy endosperm. This fact accounts for some of the difficulties encountered in separating the two during flour milling. The germ is, structurally, a separate entity; a separation of germ and endosperm should require no breaking of cell walls.

STRUCTURE OF THE MATURE WHEAT KERNEL. II. MICROSCOPIC STRUCTURE OF PERICARP, SEED COAT, AND OTHER COVERINGS OF THE ENDOSPERM AND GERM OF HARD RED WINTER WHEAT.

Dorothy Bradbury, M. M. MacMasters, and Irene M. Cull.
Cer. Chem. 33(6): 342-360. November 1956.

From the outside inward, the pericarp of hard red wheat is composed of epidermis, hypodermis, thin-walled cells, intermediate cells, cross cells, and tube cells. The cuticularized epidermis and the hypodermis of the one or two cell-layers form a compact outer covering, the beeswing. The region of crushed and fragmentary thin-walled cells affords a pathway for quick movement of water. In this region mold hyphae are usually present. Intermediate cells are largely confined to the brush and germ ends of the kernel; tube cells to the back surface. Over most of the kernel, cross cells are closely joined. Intermediate cells, cross cells at the germ and brush ends of the kernel, and tube cells form porous tissues because of many intercellular spaces. These tissues connect with a spongy parenchyma tissue in the attachment region at the base of the kernel and provide an easy route for rapid movement of water.

Interior to the pericarp lies the cuticularized seed coat joined with a corky pigment strand that runs the length of the crease. Together they cover the endosperm and germ. A second covering is provided by the nucellar epidermis joined with a nucellar projection that parallels the pigment strand.

STRUCTURE OF THE MATURE WHEAT KERNEL. III. MICROSCOPIC STRUCTURE OF THE ENDOSPERM OF HARD RED WINTER WHEAT.

Dorothy Bradbury, M. M. MacMasters, and Irene M. Cull.
Cer. Chem. 33(6): 361-373. November 1956.

Endosperm of the wheat kernel is composed of an outer layer of aleurone cells and an inner body of starch-containing cells. Flour is obtained industrially from the starchy endosperm.

The typical aleurone layer bounds the outer surface of the starchy endosperm except where the latter is in contact with the scutellum of the embryo or the endosperm cavity. The living substance of each cell consists of a nucleus and surrounding cytoplasm; the latter contains oil and many aleurone grains. The cell walls are moderately thick. A modified aleurone layer of thin-walled cells unaccompanied by starchy endosperm extends over part of the embryo. The endosperm cavity present near the crease is bordered by a modified aleurone layer composed of cells with pitted walls.

Inward from the aleurone layer the endosperm cells, with the exception of those collapsed and compressed cells that adjoin the scutellum, are filled with many starch granules embedded in a proteinaceous matrix. The cells are of three types: (1) peripheral, next to the aleurone layer; (2) central, in the centers of the cheeks; and (3) prismatic, located between the other two. Prismatic and central cells contain large lenticular starch granules and small spherical or many-sided granules; peripheral cells contain granules of an intermediate size.

The significance of the structure of the endosperm to milling problems is discussed.

STRUCTURE OF THE MATURE WHEAT KERNEL. IV. MICROSCOPIC STRUCTURE OF THE GERM OF HARD RED WINTER WHEAT.

Dorothy Bradbury, M. M. MacMasters, and Irene M. Cull.
Cer. Chem. 33(6): 373-391. November 1956.

The germ is a young plant composed of an embryonic axis partly enfolded by the shield-shaped scutellum. The plumule, composed of rudimentary stem and foliage leaves enclosed by the coleoptile, and the primary root covered by the coleorhiza make up the axis. Two pairs of secondary roots are present. One face of the scutellum is embedded in the starchy endosperm. On this surface the scutellar epidermis (the epithelium) is modified for the functions of food digestion and absorption. The epidermis of the scutellum adjacent to the plumule is heavily cutinized. The cuticle covering the embryonic axis is heavy only at the tip of the coleoptile and appears to be fragmentary or lacking over the end of the coleorhiza.

Cell characteristics that aid in the identification of embryo fragments in milled products are small size, thin walls, and contents of cytoplasm, nucleus, and oil droplets. Many of the cells, especially the scutellar parenchyma, contain small aleurone grains.

Consideration is given the possible relation of the structure of the embryo and its adjacent tissues to the initial localized entrance of water into the kernel.

THE GENUS *THAMNIDIUM* AND A STUDY OF THE FORMATION OF ITS ZYGOSPORES.

C. W. Hesseltine and Patricia Anderson.
Amer. Jour. Bot. 43(9): 696-703. November 1956.

The genus *Thamnidium* is considered to contain four species. These are *T. elegans*, *T. simplex*, *T. verticillatum* and *T. anomalum* n. sp. Descriptions and synonymy of these species are given. The zygospores of the genus are described completely for the first time. They are borne aerially and are dark-colored, roughened, borne between isogamous suspensors which are parallel to each other. In addition to requiring the presence of + and - strains, zygospore formation is dependent upon a low temperature (6-7° C.) and the presence of a proper nutrient medium. It was shown that although growth on sucrose steep agar is good, no zygospores are formed. The substitution of glucose for sucrose in this medium will allow abundant zygospore formation.

EFFECT OF THE POLLEN PARENT ON OIL CONTENT OF THE CORN KERNEL.

J. J. Curtis, A. M. Brunson, J. E. Hubbard, and F. R. Earle.
Agron. Jour. 48: 551-555. December 1956.

Oil content of the corn kernel is significantly influenced by both the seed parent and the pollen parent. Reciprocal crosses indicate a pronounced matroclinous tendency. The influence of the seed parent on composition of the endosperm is no more evident than in the germ in spite of its origin through triple fusion. Corn grown for studies of oil content should be produced by controlled pollination because of the considerable influence of the pollen parent.

THE PHOSPHORUS CONTENT OF REFINED SOYBEAN OIL AS A CRITERION OF QUALITY.

R. E. Beal, E. B. Lancaster, and O. L. Brekke.
Jour. Amer. Oil Chem. Soc. 33(12): 619-624. December 1956.

A series of tests was conducted in pilot-plant equipment with two batches of commercial crude soybean oil to determine the relation between conditions used for refining the oil and the quality of the deodorized oil. It was found that the color, iron content, and oxidative stability of the deodorized oil are closely associated with its phosphorus content. Maximum oxidative stability of the deodorized oil, as well as lowest iron content and color level, was obtained at phosphorus levels approximately not less than 2 nor more than 20 parts per million in the finished oil. Refining the oil to phosphorus levels above 20 p.p.m. had more effect on color than on stability, while reduction of the phosphorus content to less than 2 p.p.m. brought about serious impairment of stability, and to a lesser degree, an increase in the color of the deodorized oil.

ETHYL ALCOHOL-WATER WITH 2,2,4-TRIMETHYLPENTANE AND WITH 1-OCTENE AT 0° AND 25° C.

Janina Nowakowska, Carl B. Kretschmer, and Richard Wiebe.
Ind. and Eng. Chem. (Chem. & Eng. Data Series) 1(1): 42-45. 1956.

Ethyl alcohol can be used as a gasoline additive to prevent carburetor icing. In this connection, it was desirable to obtain information on the amount of alcohol that would be lost by dissolving in the water layer often present in gasoline storage tanks. The distribution of ethyl alcohol between water and two hydrocarbons, 2,2,4-trimethylpentane and 1-octene, was determined at 0° and 25° C. Solubility and tie-line data were obtained. A ternary diagram with binodal curve, tie lines, and conjugation line was constructed for 2,2,4-trimethylpentane system at 25°. "Hand" plots were drawn for both systems at the two temperatures. Losses occurring under practical conditions can be estimated from the data.

INFLUENCE OF AGGLUTINATION ON ZYGOTE FORMATION IN *HANSENULA WINGEI*, A NEW SPECIES OF YEAST.

Lynferd J. Wickerham.
Compt.-rend. Lab Carlsberg, Sér. physiol. (Denmark) 26(25): 423-443. 1956.

Some strains of *Hansenula wingei*, a new species of yeast, produce opposite sexes that agglutinate immediately when mixed. Very soon thereafter the cells fuse together in pairs, the zygotes thus formed giving rise to diploid vegetative cells. Nearly 100 percent of the cells of the opposite sexes enter into the sexual reaction following agglutination.

Other strains of this species produce opposite sexes that do not agglutinate when they are mixed. A maximum of some one percent of the mating types take part in the sexual reaction. Hybrids were made by mating an agglutinative sex with the opposite, nonagglutinative sex. About three percent of the offspring from this union were nonagglutinative, and when opposite sexes were mixed they mated very poorly. About 97 percent were agglutinative. Most of these agglutinated immediately, but a large minority agglutinated latently, several minutes after the opposite sexes were mixed. Large numbers of zygotes were produced in either case.

SIZE DISTRIBUTION AND SPECIFIC GRAVITY OF RAT PELLETS.
C. L. Mehltretter and P. R. Watson.
Consolidated Catalog and Eng. Bluebook 10(2): 286-288. 1956-1957.

The size distribution of several thousand rat pellets was determined to permit a more intelligent selection of screens for their removal by corn-processing industries. Comparison also was made of the specific gravities of a limited number of rat pellets and corn kernels. The results indicate the improbability of completely separating these materials solely by specific gravity difference.

REPUBLICATION

L'ALCOOL ET LE DEGIVRAGE DES CARBURATEURS.
CARBURETOR DE-ICING WITH ALCOHOLS.
Carl B. Kretschmer, M. M. Gilbert, W. B. Roth, and Richard Wiebe.
Alcool et Derives (French Journal) No. 63: 17-20. December 1956.
[Previously published in Industries Alimentaires et Agricoles (French Journal) 73(5): 343-346. May 1956.]

The use of ethyl alcohol as a gasoline additive to prevent carburetor icing was studied in a laboratory engine setup. Ethyl alcohol was found slightly superior to isopropyl alcohol, which is now in commercial use for this purpose. However, losses in storage and handling would be somewhat greater with ethyl than with isopropyl alcohol.

CONTRACT RESEARCH PUBLICATIONS

(Report of research work done by an outside agency under contract with the U. S. Department of Agriculture and supervised by the Northern Utilization Research and Development Division of the Agricultural Research Service.)

STUDIES ON TRICHLOROETHYLENE-EXTRACTED FEEDS. II. THE EFFECT OF FEEDING DIFFERENT LEVELS OF TRICHLOROETHYLENE-EXTRACTED SOYBEAN OIL MEAL TO YOUNG HEIFERS--EXPERIMENTAL PRODUCTION OF CHRONIC APLASTIC ANEMIA.
W. R. Pritchard, C. E. Rehfeld, W. E. Mattson, J. H. Sautter, and M. O. Schultze.
University of Minnesota, St. Paul, Minnesota.
Amer. Jour. of Veterinary Research 17(64): 430-437. July 1956.

STUDIES ON TRICHLOROETHYLENE-EXTRACTED FEEDS. V. FAILURE TO DEMONSTRATE THE PRESENCE OF A TOXIC FACTOR IN THE MILK OF COWS FED TOXIC SPECIMENS OF TRICHLOROETHYLENE-EXTRACTED SOYBEAN OIL MEAL.
W. R. Pritchard, W. E. Mattson, J. H. Sautter, and M. O. Schultze.
University of Minnesota, St. Paul, Minnesota.
Amer. Jour. of Veterinary Research 17(64): 444-445. July 1956.

*A REVIEW OF CARBOHYDRATES OF WHEAT AND OTHER CEREALS.
R. Montgomery and F. Smith.
University of Minnesota, St. Paul Minnesota.
Agr. and Food Chem. 4: 716-720. August 1956.

CHEMICAL MODIFICATION OF THE SOY BEAN HEMAGGLUTININ.
Irvin E. Liener and Shohachi Wada.
University of Minnesota, St. Paul, Minnesota.
Jour. Biol. Chem. 222(2): 695-704. October 1956.

BIOASSAY FOR TOXIC FACTOR IN TRICHLOROETHYLENE-EXTRACTED SOYBEAN OIL MEAL.
Victor Perman, C. E. Rehfeld, J. H. Sautter, and M. O. Schultze.
University of Minnesota, St. Paul, Minnesota.
Agr. and Food Chem. 4(11): 959-963. November 1956.

*STRUCTURE OF CORN HULL HEMICELLULOSE. II. IDENTIFICATION OF THE α- AND β-FORMS OF METHYL 2-O-[METHYL-(2, 3, 4-TRI-O-ACETYL-α-D-GLUCOPYRANOSYL) URONATE] 3, 4-DI-O-ACETYL-D-XYLOPYRANOSIDE.
R. Montgomery, F. Smith, and H. C. Srivastava.
University of Minnesota, St. Paul, Minnesota.
Jour. Amer. Chem. Soc. 78: 6169-6171. December 1956.

** ADD TO ARS-71-3, SUPPLEMENT 4

CONTRACT RESEARCH PUBLICATION

*STRUCTURE OF CORN HULL HEMICELLULOSE. I. PARTIAL HYDROLYSIS AND IDENTIFICATION OF 2-O-(α-D-GLUCOPYRANURONOSYL)-D-XYLOPYRANOSE.
R. Montgomery, F. Smith, and H. C. Srivastava.
University of Minnesota, St. Paul, Minnesota.
Jour. Amer. Chem. Soc. 78: 2837-2839. June 1956.

**Notice of publication received after preparation of last issue.

PATENTS

These patents are assigned to the Secretary of Agriculture. Copies of patents may be purchased from the U.S. Patent Office, Washington, D. C.

EDIBLE SPREADS FROM VEGETABLE OILS.

Edwin P. Jones and Earl B. Lancaster.
U. S. Patent 2,754,213. July 10, 1956.

A butter-like spread having spreadable plasticity over a wide range of temperature is prepared by heat treating a chilled mixture of edible vegetable oil, monoglyceride, and phosphatide.

NUTRITIVE YEAST PRODUCTS.

Lynferd J. Wickerham and Calvin C. Kuehner.
U. S. Patent 2,764,487. September 25, 1956.

An amylase-producing yeast *Endomycopsis fibuliger* or *Candida chodati* is cultivated in starchy substrates with or without the presence of compatible food yeasts such as *Torulopsis utilis*. To produce a protein food product the method is useful in converting abundant starchy materials into nutritive materials with a high protein content.

ELECTROLYTIC PRODUCTION OF ALKALI SALTS OF IODIC ACID.

Charles L. Mehltretter.
U. S. Patent 2,770,589. November 13, 1956.

A process for the preparation of alkali salts of iodic acid which comprises passage of a direct electric current through an alkaline solution of iodine in a divided cell and oxidizing the iodine at the anode to iodic acid which is recovered as alkali salt by crystallization from solution.

ANTIBIOTIC AND METHOD FOR PRODUCING IT BY *BACILLUS POLYMYXA*.

Robert G. Benedict and Frank H. Stodola.
U. S. Patent 2,771,397. November 20, 1956.

The invention relates to a new antibiotic produced by *Bacillus polymyxa*. The antibiotic is elaborated in relatively large quantities and may be isolated from the culture medium and obtained in highly active concentrations. It is quite stable and effective against gram-negative organisms.

COATING COMPOSITION STABILIZED WITH A CYANOETHYLATED PROTEIN.

Leonard L. McKinney, John C. Cowan and Cyril D. Evans.
U. S. Patent 2,775,565. December 25, 1956.

Cyanoethylated proteins are used to stabilize aqueous emulsions, particularly those used as coating compositions. The modified protein is resistant to bacterial attack and enzymic decomposition and is compatible with aldehydes and aldehyde condensates.